

WHAT IS CLAIMED IS:

1. A method for deprotecting reaction sites on a substrate comprising the steps of:
providing a substrate having protected reaction sites;
modulating light direction with a spatial light modulator so as to generate a predetermined light pattern used for deprotecting selected portions of said protected reaction sites.

2. The method of claim 1, further comprising the step of directing light from a light source to said spatial light modulator.

3. The method of claim 2, further comprising the step of projecting said predetermined light pattern onto a surface of said substrate with a lens.

4. The method of claim 3, further comprising the step of transmitting said predetermined light pattern from said lens through a micro-lens array.

5. The method of claim 2, further comprising the step of transmitting said predetermined light pattern through an array of non-imaging light concentrators.

1 6. The method of claim 4, further comprising the step of moving said substrate
2 with a translation stage.

1 7. The method of claim 2, wherein said spatial light modulator is a micro-mirror
2 array.

1 8. The method of claim 7, wherein said spatial light modulator is a DMD™.

1 9. The method of claim 2, wherein said spatial light modulator is a GLV™.

1 10. The method of claim 4, wherein said spatial light modulator is a SVGA DLP™.

1 11. The method of claim 1, further comprising the step of generating a computer
2 file that specifies, for each photolithography step, which portions of said spatial light
3 modulator will operatively illuminate which portions of said protected reaction sites.

1 12. The method of claim 11, further comprising the step of programming said
2 spatial light modulator to a desired configuration with information contained in said computer
3 file.

1 13. A method of deprotecting reaction sites on a substrate comprising:
2 providing a substrate having protected reaction sites;
3 providing a light source;

4 providing a spatial light modulator;
5 orienting said substrate, said light source, and said spatial light modulator such
6 that when said light source illuminates, intensity of illumination from said light source is
7 modulated by said spatial light modulator and generates a predetermined light image pattern;
8 and
9 illuminating said substrate with said predetermined light image pattern at said
10 substrate so as to deprotect at least one of said protected reaction sites.
11

1 14. The method of claim 13, further comprising the step of projecting said
2 predetermined light pattern onto a surface of said substrate with a lens.
3

1 15. The method of claim 14, further comprising the step of transmitting said
2 predetermined light pattern from said lens through a micro-lens array.
3

4 16. The method of claim 13, further comprising the step of transmitting said
5 predetermined light pattern through an array of non-imaging light concentrators.
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1 17. The method of claim 15, further comprising the step of moving said substrate
2 with a translation stage.
3

1 18. The method of claim 13, wherein said spatial light modulator is a micro-mirror
2 array.
3

1 19. The method of claim 18, wherein said spatial light modulator is a DMD™.

2

1 20. The method of claim 13, wherein said spatial light modulator is a GLV™.

2

1 21. The method of claim 15, wherein said spatial light modulator is a SVGA
2 DLP™.

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1 22. The method of claim 13, further comprising the step of generating a computer
2 file that specifies, for each photolithography step, which portions of said spatial light
3 modulator will operatively illuminate which portions of said protected reaction sites.

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1 23. The method of claim 22, further comprising the step of programming said
2 spatial light modulator to a desired configuration with information contained in said computer
3 file.

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1 24. An optical lithography system, consisting essentially of:
2 a light source;
3 a substrate mount; and
4 a means for dynamically defining a light pattern using unpatterned light from
5 said light source without using a photomask.

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1 25. The optical lithography system of claim 24, wherein said means for
2 dynamically defining a light pattern includes a spatial light modulator module modulating
3 light direction or light intensity to generate a predetermined light image.
4

1 26. The optical lithography system of claim 24, wherein said means for
2 dynamically defining a light pattern includes a micro-mirror array modulating light by
3 changing angular position of micro-mirrors in said micro-mirror array.
4

1 27. The optical lithography system of claim 25, wherein said spatial light
2 modulator is a DMD™.
3

1 28. The optical lithography system of claim 25, wherein said spatial light
2 modulator is a GLV™.
3

1 29. The optical lithography system of claim 25, wherein said spatial light
2 modulator is a SVGA DLP™.
3

1 30. The optical lithography system of claim 29, wherein said light source includes
2 an arc lamp.
3

1 31. The optical lithography system of claim 26, wherein said micro-mirror array
2 includes a plurality of micro-mirrors, each of said micro-mirrors selectively illuminate a
3 single feature on a substrate using specular reflection of light directed toward said substrate

4 (turn on), and selectively not illuminating of said single feature by specular reflection of light
5 directed away from said substrate (turn off).
6

1 32. An optical lithography system, comprising:
2 a spatial light modulator which provides a predetermined two dimensional
3 light pattern on a substrate without use of a photomask and holographic image.
4

1 33. The optical lithography system of claim 32, wherein said predetermined two
2 dimensional light image is used for deprotecting reaction sites of a polymer array.
3

1 34. The optical lithography system of claim 33, further comprising a light source.

1 35. The optical lithography system of claim 34, wherein said light source includes
2 an arc lamp.
3

1 36. The optical lithography system of claim 35, wherein said spatial light
2 modulator includes a micro-mirror array modulating light by changing angular position of
3 micro-mirrors in said micro-mirror array.